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should be made, as it is, at the end of the chapter on time and space. But, leaving aside all captious criticism, it is safe to say that 'Properties of matter' is one of the best introductory text-books of physics of which we are as yet possessed.

Whether the lectures on 'Recent advances in physical science' can be used in the classroom, may be questioned. Of the value of the book for collateral reading, there can be no question. This is well enough shown in the fact that we now have the third edition. The desire to deduce much of our knowledge of physical principles from Newton's writings is apparent on many pages of the book, and has given rise to a discussion which is referred to in the preface.

The 'Practical physics,' of which we are promised three volumes, — the first only giving an account of general physical processes, — is intended as a guide for laboratory work. The explanations are clear, and the matter and instruments referred to are such as one actually meets in practice. The book is given up to a description of the ways to measure length and mass; the determination of density; the testing of the laws of elasticity, tenacity, and capillarity; and the measurement of atmospheric pressure, time, and the force of gravity. At the end is given an appendix on the selection, conduct, and discussion of operations suitable for the physical laboratory. The other volumes planned are to be devoted to electricity and magnetism, and heat, light, and sound. It is to be hoped that the succeeding volumes may equal that already published, which is the best book, for its purpose, we know of.

The school world is certainly to be congratulated on the addition to its literature of two such books as 'Properties of matter' and 'Practical physics.'

METHODS OF BACTERIA CULTURE.

THE need of a book in English, giving information as to the best methods of bacteria culture and observation, is a growing one; and, before opening the work under consideration, we were led to hope that it would fill, in a satisfactory manner, the vacancy that now exists.

We are disappointed in it, however, and for these reasons. A large number of methods and materials are described, staining-fluids are

given, and authors mentioned; but the whole is thrown together with little or no criticism, and the beginner is as likely to adopt the wrong as the right method of procedure. Particularly is this the case in that portion of the book giving the methods of staining the bacillus of tuberculosis. These methods have been pretty well tested and sifted out; and there is no reason why they should all be given at length, with no more criticism of their value than we find here. As far as investigation yet shows, Koch's or Ehrlich's methods are the ones which are to be absolutely relied upon. Gibbs's double method of staining is absolutely worthless, as the author should know.

The preface to the book states the author's hope that it will be of value to "American investigators, and assist them in adding their share . . . to the mass of facts concerning bacteria;" but surely it would have aided the student still more if he had been informed that all the materials for culture-media and staining-fluids can be obtained in this country as well as abroad.

The form of the book, being of thick paper, and opened with difficulty, is exceedingly inconvenient; and we cannot condemn too strongly the fact that over one-third of the space is taken up by the references, which are printed in the same type as the text.

THE PERMIAN REPTILES OF BOHEMIA.

OF this excellent work, we have now before us the first volume, and the first part of the second one, containing the *Stegocephali Cope* (*Labyrinthodontia auctorum*); in all, two hundred and fourteen quarto pages text, and sixty plates, some of them folding. The present work is not only the best ever given on the subject, but one of the most valuable publications which has ever appeared in paleontology. The Lyell prize, awarded to the author by the Geological society of London, is one testimony to its excellence. The plates are among the best we have ever seen, and were all drawn by the author himself.

After an introduction showing the geological position of the fossils, a preliminary review of the fossils found is given, which consist of the following species: *Stegocephali*, 43; *Dipnoi*, 2; *Pisces*, 31; *Insecta*, 1; *Arachnoidea*, ?; *Myriapoda*, 3; *Crustacea*, 5; *Mollusca*, 1.

This is followed by a detailed history of the

different systems proposed for the labyrinthodonts, forming a very convenient compilation for the student. The rest of the book is devoted to descriptions of the different families of the Stegocephali. The author concludes that the paleontological material is still too meagre to venture on a genealogical table, but promises to offer a comparative discussion at the end of the whole work.

The first part of the second volume contains the Dendropetondidae, Diplovertebridae, Archaeosauridae, Chauliodontia (Miall), and Melosauridae. In the beginning we find the remarkable note, that it is difficult to accept Cope's division into Rachitomi and Embolomeri, based on the characters of the vertebrae, because both kinds of vertebrae (rachitinous and embolomeric) can be found in the same animal. The embolomeric form seems to be developed in the caudal, the rachitinous form in the thoracic region.

The question whether the hypocentrum or the pleurocentra constitutes the base of the vertebra is decided by Fritsch in the following way: A normal vertebra with *one* centrum never can be formed from a rachitinous vertebra, but only an embolomeric vertebra with two disks. The rachitinous form prepares the embolomeric, and it is not surprising that both forms exist in the same animal.

The following parts will contain the fishes and arthropods, and in the final part the general conclusions will be given.

Finally, it should be mentioned that galvanoplastic copies of thirty-five Stegocephali have been prepared by the author, which cannot be distinguished from the originals. They are obtainable at the low price of fifty dollars from the author, 35 Brenntegasse, Prague.

PRACTICAL BOTANY.

TEACHERS who carry their classes beyond the elements of analytical botany find the number of adjuncts at their disposal increasing rapidly, so far, at least, as histology is concerned. Beside general text-books of all grades, and the treatises, large and small, on the methods of microscopical work, explicit directions for the study of common representative plants are now published in several languages.

So far as a short course is concerned, the

A course of practical instruction in botany. By F. O. BOWER, M.A., F.L.S., and SYDNEY H. VINES, M.A., D.Sc., F.L.S. Part I. Phanerogamae-Pteridophyta. London, Macmillan & Co., 1885. 11+226 p. 16°.

demand for laboratory directions is already well met by the botanical portion of Huxley and Martin's 'Biology,' which any capable teacher can bring to date by a few lectures, and supplement by synopses of work for a few additional plants, like Spirogyra, Aspergillus, and Penicillium; and it is doubtful if many courses offered in America are comprehensive enough to warrant carrying this part of the work further. Yet to students who have time for additional work in this direction, without the knowledge requisite for carrying it on independently, this little book of Mr. Bower's, which owes its origin to the same causes that produced Huxley and Martin, will prove exceedingly useful. If it cannot be said to equal Strasburger's 'Botanisches practicum,' it has the merit of being in English, and bears evidence of careful workmanship on every page, while it is sensibly bound for laboratory use.

NOTES AND NEWS.

THE vessel Alert, sent to visit the stations established last summer in and *en route* to Hudson Bay, has been obliged to return by reason of the prevalence of pack-ice, the exhaustion of their coal, and certain damages sustained. She will start again; but those interested in the commercial route *via* Hudson Bay to Manitoba are much disappointed; and the return is generally regarded as evidence that such a route would be even more precarious and uncertain than its opponents have claimed.

— Dr. Elkin, in charge of the heliometer of the Yale-college observatory, has been engaged for nearly a year and a half past in measuring the group of the Pleiades, his original plan being to measure with this instrument the same stars which Bessel measured with the Königsberg heliometer about fifty years ago. Dr. Elkin has taken advantage of all the improvements in the instrument and the methods of using it which have been developed in the last half-century; and, in addition to the successful carrying-out of his carefully elaborated plan of triangulation, he has also been able to extend his work to a large number of stars which Bessel did not measure. The position-angle and distance of the Bessel stars from the large star Alcyone are included in the work. The results of this very valuable work cannot be fully discussed, and prepared for publication, until the positions of certain stars of reference have been obtained from the work of other observatories where they are now being determined. Dr. Elkin has also obtained measures of the distances of a number of craters on the moon from neighboring stars, on thirty-six nights, near the times of first and last quarter. The positions of these craters on the moon itself have been determined; also series of measures made of the diameters of Venus, of the outer ring of Saturn, and of the satellite Titan